

In re Jun Keun CHANG, et al
Appn. No. 10/583,149
Amendment dated December 24, 2009
Reply to Office Action dated September 24, 2009

REMARKS

The Final Office Action mailed September 24, 2009, and the newly cited prior art relied upon have been carefully studied. The claims in the application are now claims 1-20 with the main claims having been substantially revised to better highlight the distinctions of the present invention over the prior art. The claims define patentable subject matter and should be allowed. Favorable reconsideration and allowance are earnestly solicited.

New claim 20 has been added as a fourth independent claim. This calls for the method in somewhat more detail than present claims 1 and 2, and is patentable for the same reasons as the other claims, as pointed out below. The feature of flow by capillary action is supported for example at page 8, line 10.

Claims 1-19 have been rejected under §103 as allegedly obvious from a combination of four distinct references, namely newly cited Fujiyama USP 6,559,940 (Fujiyama) in view of McReynolds USP 6,425,972 (McReynolds), Chou U.S. Publication 2002/0177319 (Chou) and Ikeda et al USP 4,485,171 (Ikeda). This rejection is respectfully traversed.

First, and with the greatest respect, Applicants believe and submit that it is unreasonable to conclude that what is basically a two-step operation can only be met by taking bits and pieces from four separate references. Applicants resolutely maintain that the person of ordinary skill in the art

considering the four references together would not have reached Applicants' method.

The presently claimed invention is characterized in that recesses are formed in each of side lower ends of the bonding region of the upper substrate, the recesses are fine open channels in preferably the upper substrate as illustrated, so that the channels are open to the interface between the substrates, and the organic solvent is thus introduced by capillary action. Further, the bonding region between the substrates in the claimed subject matter is bonded by the organic solvent introduced into the recesses.

Fujiyama discloses the elements, the upper substrate, the lower substrate and holes for filling a sample. However, Fujiyama does not disclose the recesses for being bonded by introducing the organic solvent, and instead requires joining the substrates by pre-sputtering SiO₂ thin films on the surfaces to be joined.

McReynolds discloses grooves and/or indentations (Item 16). However the elements are for communication with at least one of the channels and/or chambers, and certainly not for bonding between top substrate and a bottom substrate. Rather, the Item 16 of McReynolds corresponds to sample filling space channel (10) of the present invention, that is, the Item 16 of McReynolds is not a sealed region. McReynolds simply does not teach the use of such channels for bonding.

Chou discloses recesses for bonding by using an o-ring seated within the recesses. However, Chou does not disclose the

technical feature of present application, that is, bonding by the organic solvent introduced into the recesses.

Ikeda merely discloses a method of bonding between an upper work piece and a lower work piece, and does not disclose bonding method using recesses of the present invention.

Moreover, Fujiyama, McReynolds, Chou or Ikeda do not disclose an open channel of present application for bonding.

The recesses of the present invention are open channels, i.e. the opening of the channels face the interface between the substrates so the organic solvent flows into the interface. Therefore, the upper substrate and the lower substrate can be sealed only by capillary phenomenon without applying excess pressure. However, in Fujiyama, McReynolds, Chou and Ikeda, forming the upper substrate and the lower substrate requires pressure.

To summarize, even if it were obvious to combine the references (respectfully denied), the resultant reconstructed Fujiyama would still not meet the claimed subject matter at least because the four references together would still not provide the open channels with the resultant bonding through the use of solvent flowing by capillary action.

Moreover, Applicants believe and respectfully submit that the proposed combination would not have been obvious in the first place, because the four references use and indeed require different mechanisms; e.g. to modify Fujiyama as proposed would not have been obvious because it would require modification of Fujiyama in such a way as to be contrary to Fujiyama, e.g. with respect to the type of bonding which is required by Fujiyama.

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In other words, Fujiyama teaches away from the proposed combination and away from the present invention.

Withdrawal of the rejection is in order and is respectfully requested.

The prior art documents of record and not relied upon by the PTO have been noted, along with the implication that such documents are deemed by the PTO to be insufficiently material to warrant their application against any of Applicants' claims.

Applicants believe that all issues raised in the Final Rejection have been addressed above in a manner that should lead to patentability of the present application. Favorable consideration and early formal allowance are respectfully requested.

If the Examiner has any questions or suggestions, the Examiner is respectfully requested to contact the undersigned at (202) 628-5197.

Respectfully submitted,

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